

APPENDIX C. Arizona's Surface and Ground Water Quality Standards

SELECTED ARIZONA SURFACE WATER QUALITY NUMERIC STANDARDS (excluding VOCs, SOCs, and pesticides not used in this assessment)				
PARAMETER		DESIGNATED USE(S)	STANDARD OR ASSESSMENT CRITERIA	CHRONIC STANDARDS
Ammonia (NH3)		A&Wc/A&Ww	Standard varies by temperature and pH., see table in standards.	
Antimony (Sb)	dissolved	A&Wc/A&Ww A&Wedw	88 µg/L 1,000 µg/L	30 µg/L 600 µg/L
	total	DWS FBC/PBC FC	6 µg/L 56 µg/L 140 µg/L	NA
Arsenic (As)	dissolved	A&Wc/A&Ww/A&Wedw A&We	360 µg/L 440 µg/L	190 µg/L 230 µg/L
	total	DWS/FBC/PBC AGL FC AGI Peeples Canyon Creek (Unique Waters)	50 µg/L 200 µg/L 1450 µg/L 2,000 µg/L 20 µg/L	NA
Barium (Ba)	dissolved	FBC/PBC	9,800 µg/L	NA
	total	DWS	2,000 µg/L	
Beryllium (Be)	dissolved	A&Wc/A&Ww/A&Wedw	65 µg/L	5.3 µg/L
	total	FC DWS/ FBC PBC	0.21 µg/L 4 µg/L 700 µg/L	NA NA NA
Boron (B)	total	DWS AGI FBC/PBC	630 µg/L 1,000 µg/L 12,600 µg/L	NA
	Cadmium (Cd)	dissolved	A&W	Standard varies by water hardness*, see published standards.
total		DWS	5 µg/L	NA
		FC	41 µg/L	
		AgI/AgL	50 µg/L	
	FBC/PBC	70 µg/L		
Chlorine (total residual) (Cl)		A&Wc/A&Ww/A&Wedw FBC/PBC	11 ug/L 14mg/L	5 ug/L
Chromium (Cr)	dissolved	Unique Waters standards for: West Fork Little Colorado River, above Government Springs Oak Creek and West Fork Oak Creek	10 µg/L 5 µg/L	
	total	DWS AgI/AgL	100 µg/L 1,000 µg/L	NA
Chromium III (Cr III)	dissolved	A&Ww/A&Wc/A&We/A&Wedw	Standard varies by water hardness*, see published standards.	
	total	FC FBC/PBC	67,000 µg/L 140,000 µg/L	NA
Chromium VI (Cr VI)	dissolved	A&Wc/A&Ww/A&Wedw/	16 µg/L	11 µg/L

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PARAMETER	DESIGNATED USE(S)	STANDARD OR ASSESSMENT CRITERIA	CHRONIC STANDARDS	
Copper (Cu)	total	A&We	34 µg/L	23 µg/L
		FBC/PBC	700 µg/L	NA
		FC	3,400 µg/L	
	dissolved	A&Ww/A&Wc/A&We/A&Wedw	Standard varies by water hardness, see published standards.	
Cyanide (Cn)	total	DWS	1,000 µg/L	NA
		PBC/FBC	5,200 µg/L	
	total	AgL	500 µg/L	NA
		AgI	5,000 µg/L	
Dissolved Oxygen (DO)	total	A&Wc	22 µg/L	5.2 µg/L
		A&Ww/A&Wedw	41 µg/L	9.7 µg/L
		A&We	84 µg/L	19 µg/L
		AgL, DWS	200 µg/L	
Escherichia coli	total	FBC/PBC	2,800 µg/L	
		FC	210,000 µg/L	
Fecal Coliform	total	A&Ww	>6.0 mg/L	
		A&Wc	>7.0 mg/L	
		A&Wedw	>3.0 mg/L	
			>1.0 mg/L	
Fluoride or Fluorine (F)	total	West Fork Little Colorado (Unique Waters)	no decrease due to discharge	
		Peoples Canyon Creek (Unique Waters)		
		Cienega Creek (Unique Waters)		
		Bonita Creek (Unique Waters)		
Lead (Pb)	total	FBC	30-day geometric mean (5 sample minimum) = 130 CFU/100ml single sample maximum = 580 CFU/100ml	
		A&Wedw	30-day geometric mean (5 sample minimum) = 200 CFU/100 ml 10% samples for a 30-day period = 400 CFU/100 ml single sample maximum = 800 CFU/100 ml	
		A&Ww/A&Wc/A&We/A&Wedw/DWS/PBC/AgI/AgL	30-day geo. mean (5 sample minimum) = 1,000 CFU/100 ml 10% samples for a 30-day period = 2,000 CFU/100 ml single sample maximum = 4,000 CFU/100 ml	
Manganese (Mn)	total	DWS	4 mg/L	NA
		FBC/PBC	8.4 mg/L	
Mercury (Hg)	total	A&Ww/A&Wc/A&We/A&Wedw	Standard varies by water hardness, see published standards*.	
		DWS	50 µg/L	NA
		AgL	100 µg/L	
		AgI	10,000 µg/L	
Manganese (Mn)	total	DWS	4,900 µg/L	NA
		AgI	10,000 µg/L	
		FBC/PBC	19,600 µg/L	
		Unique Waters standards for: People's Canyon Creek, Burro Creek, and Francis Creek	500 µg/L	
Mercury (Hg)	dissolved	A&Wc/A&Ww	2.4 µg/L	0.01 µg/L
		A&Wedw	2.6 µg/L	0.2 µg/L
		A&We	5.0 µg/L	2.7 µg/L
Mercury (Hg)	total	FC	0.6 µg/L	NA

SELECTED ARIZONA SURFACE WATER QUALITY NUMERIC STANDARDS (excluding VOCs, SOCs, and pesticides not used in this assessment)			
PARAMETER	DESIGNATED USE(S)	STANDARD OR ASSESSMENT CRITERIA	CHRONIC STANDARDS
Nickel (Ni)	dissolved	DWS AgL FBC/PBC	2 µg/L 10 µg/L 42 µg/L
	total	A&W	Standard varies by water hardness, see published standards*.
Nitrate (as nitrogen) (NO3)		DWS FC FBC/PBC	100 µg/L 730 µg/L 2,800 µg/L
		DWS mean value San Pedro (Curtiss-Benson) FBC/PBC	10 mg/L 10 mg/L 224 mg/L
Nitrate/Nitrite (as nitrogen) (NO3/NO2)		DWS	10 mg/L
Nitrite (as nitrogen) (NO2)		DWS FBC/PBC	1 mg/L 14 mg/L
Nitrogen (N)	total	See nutrient chart below	
pH		A&W/FBC/PBC/AgL DWS AgI	6.5 - 9.0 5.0 - 9.0 4.5 - 9.0
		All waters except Unique Waters Unique Water standards for: Bonita Creek, Cienega Creek, West Fork Little Colorado, Oak Creek, and West Fork Oak Creek	Maximum change due to discharge = 0.5 No change due to discharge
Phosphorus (P)	total	See nutrient chart below	
Selenium (Se)	total	A&Ww/A&Wc AgL A&We A&Wedw AgL/DWS FBC/PBC FC	20 µg/L 20 µg/L 33 µg/L 50 µg/L 50 µg/L 700 µg/L 9,000 µg/L
			2 µg/L NA 2 µg/L 2 µg/L NA NA NA
Silver (Ag)	dissolved	A&Ww/A&Wc/A&We/A&Wedw	Standard varies by water hardness, see published standards*.
	total	DWS (SMCL)	100 µg/L
Sulfides (S2)		A&W	0.1 mg/L
Temperature (maximum increase due to discharge)		A&Wc A&Ww/A&Wedw	1.0 ° C 3.0 ° C
		Unique Water standards for: Bonita Creek, Cienega Creek, West Fork Little Colorado, and People's Canyon	no increase due to discharge
Thallium (Tl)	dissolved	A&Wc/A&Ww/A&Wedw	700 µg/L
	total	DWS FBC/PBC FC	2 µg/L 12 µg/L 41 µg/L
Total Dissolved Solids (TDS)		DWS mg/L (SMCL) AgI (EPA criteria -- more sensitive crops) AgI (EPA criteria -- less sensitive crops)	500 mg/L 1000 mg/L 2000 mg/L

SELECTED ARIZONA SURFACE WATER QUALITY NUMERIC STANDARDS (excluding VOCs, SOCs, and pesticides not used in this assessment)			
PARAMETER		DESIGNATED USE(S)	STANDARD OR ASSESSMENT CRITERIA
Turbidity		Unique Water standards for: West Fork Little Colorado River, Bonita Creek, & Cienega Creek	no increase due to discharge
		Colorado River: below Hoover Dam below Parker Dam at Imperial Dam	NA
		A&Wc (streams & lakes)	10 NTU
		A&Wedw, A&Ww (lakes only)	25 NTU
		A&Ww, A&Wedw (streams only)	50 NTU
Uranium (Ur)	dissolved	Oak Creek (Unique Waters)	3 NTU change due to discharge
		Peoples Canyon Creek (Unique Waters)	5 NTU change due to discharge
		Cienega Creek (Unique Waters)	10 NTU
		Bonita Creek (Unique Waters)	15 NTU
		DWS	35 µg/L
Zinc (Zn)	dissolved	A&Ww/A&Wc/A&We/A&Wedw	Standard varies by water hardness*, see published standards.
		DWS	2,100 µg/L
		AgI	10,000 µg/L
		FC	22,000 µg/L
		AgL	25,000 µg/L
	total	FBC/PBC	42,000 µg/L

SURFACE WATER QUALITY STANDARDS FOR RADIOCHEMICALS		
Radiochemical	Designated Use	Standard (mean value)
Gross Alpha (excluding radon and uranium)	DWS	15 pCi/L
Radium-226 + Radium-228	DWS	5 pCi/L
Strontium 90	DWS	8 pCi/L
Tritium	DWS	20,000 pCi/L

SURFACE WATER QUALITY NUTRIENT STANDARDS						
WATERSHED OR SITE SPECIFIC LOCATION		Annual Mean		90th Percentile		Single Sample Max
Verde River and tributaries -- above Bartlett Lake		Phosphorus	0.10 mg/L	Phosphorus	0.30 mg/L	Phosphorus 1.00 mg/L
		Nitrogen	1.00 mg/L	Nitrogen	1.50 mg/L	Nitrogen 3.00 mg/L
Oak Creek including West Fork (in Verde Watershed) (Unique Waters standard)		Phosphorus	0.10 mg/L	Phosphorus	0.25 mg/L	Phosphorus 0.30 mg/L
		Nitrogen	1.00 mg/L	Nitrogen	1.50 mg/L	Nitrogen 2.50 mg/L
Black River, Tonto Creek and their tributaries (in Salt Watershed)		Phosphorus	0.10 mg/L	Phosphorus	0.20 mg/L	Phosphorus 0.80 mg/L
		Nitrogen	0.50 mg/L	Nitrogen	1.00 mg/L	Nitrogen 2.00 mg/L
Salt River and tributaries (except Pinal Creek) -- from confluence of Black and White to Roosevelt Lake		Phosphorus	0.12 mg/L	Phosphorus	0.30 mg/L	Phosphorus 1.00 mg/L
		Nitrogen	0.60 mg/L	Nitrogen	1.20 mg/L	Nitrogen 2.00 mg/L
Salt River -- below Stewart Mtn. Dam to confluence w/Verde River		Phosphorus	0.05 mg/L	Phosphorus	NNS	Phosphorus 0.20 mg/L
		Nitrogen	0.60 mg/L	Nitrogen	NNS	Nitrogen 3.00 mg/L
Roosevelt, Apache, Canyon, and Saguaro Lakes (composites at 2- and 5-meter depth)		Phosphorus	0.03 mg/L	Phosphorus	NNS	Phosphorus 0.60 mg/L
		Nitrogen	0.30 mg/L	Nitrogen	NNS	Nitrogen 1.00 mg/L (maximum of any set)
Little Colorado River and tributaries -- above River Reservoir. in Greer; So Fork LCR -- above South Fork Campground; and Water Canyon Creek --above USFS boundary		Phosphorus	0.08 mg/L	Phosphorus	0.10 mg/L	Phosphorus 0.75 mg/L
		Nitrogen	0.60 mg/L	Nitrogen	0.75 mg/L	Nitrogen 1.10 mg/L
Little Colorado River -- at Apache County Road No 124		Phosphorus	NNS	Phosphorus	NNS	Phosphorus 0.75 mg/L
		Nitrogen	NNS	Nitrogen	NNS	Nitrogen 1.80 mg/L
Little Colorado River -- from Amity Ditch diversion near AZ Hwy 273 to Lyman Lake (only when < 50 NTU)		Phosphorus	0.20 mg/L	Phosphorus	0.30 mg/L	Phosphorus 0.75 mg/L
		Nitrogen	0.70 mg/L	Nitrogen	1.20 mg/L	Nitrogen 1.50 mg/L
Colorado River -- at Mexico/US Northern International Border near Morales Dam		Phosphorus	NNS	Phosphorus	0.33 mg/L	Phosphorus NNS
		Nitrogen	NNS	Nitrogen	2.50 mg/L	Nitrogen NNS
San Pedro River -- from Curtis to Benson.		Phosphorus	NNS	Phosphorus	NNS	Phosphorus NNS
		Nitrogen	NNS	Nitrogen	NNS	Nitrate (as N) 10 mg/L

*Dissolved metal standards are calculated using equations published with the surface water standards (e.g., copper A&Wc acute standard: $e^{(0.9422 [\ln(\text{hardness})] - 1.464)}$. In these equations, hardness (expressed as CaCO₃) does not exceed 400 mg/L; therefore, use 400 mg/L hardness if result is greater than 400 mg/L.

Narrative Water Quality Standards

Narrative Surface Water Quality Standards

R18-11-108 -- A surface water shall be free from pollutants in amounts or combinations that:

- Settle to form bottom deposits that inhibit or prohibit the habitation, growth, or propagation of aquatic life or that impair recreational uses (bottom deposits standard);
- Cause objectionable odor in the area in which the surface water is located;
- Cause off-taste or odor in drinking water;
- Cause off-flavor in aquatic organisms or waterfowl;
- Are toxic to humans, animals, plants or other organisms (toxics standard);
- Cause the growth of algae or aquatic plants that inhibit or prohibit the habitation, growth, or propagation of other aquatic life or that impair recreational uses (narrative nutrient standard);
- Cause or contribute to a violation of an aquifer water quality standard prescribed in R18-11-405 or R18-11-406; or
- Change the color of the surface water from natural background levels of color.

A surface water shall be free from oil, grease, and other pollutants that float as debris, foam, or scum; or that cause a film or iridescent appearance on the surface of the water; or that cause a deposit on a shoreline, bank, or aquatic vegetation. The discharge of lubricating oil or gasoline associated with the normal operation of a recreational water-craft shall not be considered a violation of this narrative standard.

Narrative Aquifer Water Quality Standards

R18-11-405:

- A discharge shall not cause a pollutant to be present in an aquifer classified for a drinking water protected use in a concentration which endangers human health.
- A discharge shall not cause or contribute to a violation of a water quality standard established for a navigable water of the state.
- A discharge shall not cause a pollutant to be present in an aquifer which impairs existing or reasonably foreseeable uses of water in an aquifer.

Arizona's Numeric Aquifer Water Quality Standards

ARIZONA'S GROUND WATER STANDARDS FOR INORGANIC CHEMICALS	
CONTAMINANT NAME (ABBREVIATION, TRADE OR GENERIC NAME)	AQUIFER WATER QUALITY STANDARDS (µg/L unless stated)
Antimony (Sb)	6
Arsenic (As)	50
Asbestos	7,000,000 fibers/Liter (longer than 10 µm)
Barium (Ba)	2000
Beryllium (Be)	4
Cadmium (Cd)	5
Chromium (total) (Cr)	100
Cyanide (Cn)	200 (as free cyanide)
Fluoride (F)	4 mg/L
Lead (Pb)	50
Mercury (Hg)	2
Nickel (Ni)	100
Nitrate (NO ₃ as N)	10.0 mg/L
Nitrite (NO ₂ as N)	1.0 mg/L
Nitrate + Nitrite (as N)	10 mg/L
Selenium (Se)	50
Thallium (Tl)	2

**ARIZONA'S GROUND WATER STANDARDS FOR ORGANIC CHEMICALS, PESTICIDES,
PETROLEUM HYDROCARBONS, AND POLYCHLORINATED BIPHENYL (PCBs)**

CONTAMINANT NAME (ABBREVIATION, TRADE OR GENERIC NAME)	AQUIFER WATER QUALITY STANDARDS (µg/L unless stated)
Alachlor (Lasso)	2
Atrazine (Atranex, Crisazina)	3
Benzene	5
Benzo(a)pyrene	0.2
Carbofuran (Furadan 4F)	40
Carbon tetrachloride (Freon-10)	5
Chlordane	2
2,4-D (Formula 40, Weedar 64) 2,4-Dichlorophenoxyacetic Acid	70
Dalapon or 2,2-Dichloropropionic acid	200
Dibromochloromethane (DBCM or THM)	0.2
Dibromochloropropane (DBCP)	0.2
Dichlorobenzene (DCB)	o-DCB = 600 p-DCB = 75
Dichloroethane (DCA)	1,2-DCA = 5
Dichloroethylene or Dichloroethene (DCE)	1,1-DCE = 7 cis-1,2-DCE = 70 trans-1,2-DCE = 100
Dichloromethane	5
Dichloropropane	1,2-DCP = 5
Di(2-ethylhexyl)adipate (DOA)	400
Di(2-ethylhexyl)phthalate (DOP)	6
Dinoseb 2,4-Dinitro-6-sec-butyl-phenol (DNBP)	7
Dioxin 2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	0.00003
Diquat or Dihydrodipyrido-pyrazidinium salt	20

**ARIZONA'S GROUND WATER STANDARDS FOR ORGANIC CHEMICALS, PESTICIDES,
PETROLEUM HYDROCARBONS, AND POLYCHLORINATED BIPHENYL (PCBs)**

CONTAMINANT NAME (ABBREVIATION, TRADE OR GENERIC NAME)	AQUIFER WATER QUALITY STANDARDS (µg/L unless stated)
Endothall or Oxalobicyclo-heptane-dicarboxylic acid disodium salt	100
Endrin or Hexachloroepoxyoctahydro-endo-dimethanonaphthalene	2
Ethylene dibromide (EDB)	0.05
Ethylbenzene (ETB)	700
Glyphosate or N-(phosphonomethyl)glycine	700
Heptachlor	0.4
Heptachlor epoxide	0.2
Hexachlorobenzene or Perchlorobenzene	1
Hexachlorocyclopentadiene or Perchlorocyclopentadiene	50
Lindane or gamma-Benzene hexachloride	0.2
Methoxychlor (Methoxy DDT, DMDT)	40
Monochlorobenzene, or Chlorobenzene, or Phenyl chloride	100
Oxamyl	200
Perchloroethylene (PCE), Tetrachloroethylene or Tetrachloroethene	5
Pentachlorophenol	1
Picloram	500
Polychlorinated biphenyl (PCB)	0.5
Silvex 2-(2,4,5-Trichlorophenoxy)propionic acid	50
Simazine 2-Chloro-4,6-bis(ethylamino)-2-triazine	4
Styrene	100
1,2,4-Trichlorobenzene	70
Trichloroethane (TCA)	1,1,1-TCA = 200 1,1,2-TCA = 5
Trichloroethylene or Trichloroethene (TCE)	5

ARIZONA'S GROUND WATER STANDARDS FOR ORGANIC CHEMICALS, PESTICIDES, PETROLEUM HYDROCARBONS, AND POLYCHLORINATED BIPHENYL (PCBs)	
CONTAMINANT NAME (ABBREVIATION, TRADE OR GENERIC NAME)	AQUIFER WATER QUALITY STANDARDS (µg/L unless stated)
Toluene (TOL)	1000
Toxaphene	3
Vinyl chloride (VC)	2
Xylene (XYL)	10,000

ARIZONA'S GROUND WATER STANDARDS FOR RADIOCHEMICALS, PHYSICAL MEASUREMENTS, AND BACTERIA	
CONTAMINANT NAME (ABBREVIATION, TRADE OR GENERIC NAME)	AQUIFER WATER QUALITY STANDARDS (µg/L unless stated)
Beta particle + photon human-caused radionuclides	4 millirem/year
Gross alpha (include Radium-226, exclude radon and uranium)	15 pCi/L
Radium-226 + Radium-228	5 pCi/L
Strontium-90	4 millirem/year 8 pCi/L in bone marrow
Tritium	4 millirem/year 20,000 pCi/L in total body
Total coliform	0 per 100 ml
Turbidity	1 NTU monthly mean, 5 NTU (if 0 fecal coliform after chlorination), 5 NTU (2-day mean)

Surface water and aquifer protection standards are published in Arizona Administrative Code Title 18, Chapter 11 (R18-11-101 through R18-11-506).